What kinds of processes or events might cause the Earth's climate to change?

Cutting down rainforests
pollution / trash / waste products
Dams
Human use of water
Chemicals / sprays

Climate Change Unit

End Product (Unit Assessment)

After reading informational texts and examining climate change models, write a climate assessment report in which you discuss the current impacts of climate change on Earth's systems and evaluate which future predictions are most likely. What conclusions can you draw about possible response strategies to address the impact of climate change? Support your position with evidence from the text/s. Be sure to acknowledge competing views. Include charts to help convey your message to your readers.

Climate Change Unit
Activity 1 p. E84

I Will Be Able To (IWBAT) describe the climate of my community through looking at temperature and precipitation data and determine what physical features in my community influence the local climate by looking at topographic maps. I will demonstrate my understanding in discussions with partners and written responses to prompts using vocabulary such as temperature, precipitation, and elevation.

Seré capaz de describirá el clima de mi comunidad a través de la observación de los datos de temperatura y precipitación y determinará qué características físicas de mi comunidad influyen en el clima local al observar los mapas topográficos. Demostraré mi comprensión en las discusiones con los socios y las respuestas escritas a las preguntas utilizando vocabulario como la temperatura, la precipitación y la elevación.

Climate Change Unit
Activity 1 p. E84

In Schoology, course Earth Science 2, folder Unit 6 Climate Change, folder Week 1, folder Activity 1,

1. **proceed to the assignment Climate Change Activity 1 Notes & Questions,**
2. **open the attached document,**
3. **complete the What do you see? and What do you think? sections,**
4. **discuss your results as a table, and**
5. **complete Parts A & B of the Investigate with a partner.**

En Schoology, curso Earth Science 2, carpeta Unidad 6 Cambio climático, carpeta Semana 1, carpeta Actividad 1,

1. **proceder a la tarea Actividad 1 sobre Cambio Climático, Notas y Preguntas,**
2. **abra el documento adjunto,**
3. **completa el ¿Qué ves? ¿y, qué piensas? secciones,**
4. **discuta sus resultados como una tabla, y**
5. **complete las Partes A y B de Investigar con un compañero.**

IWBAT describe the climate of my community through looking at temperature and precipitation data and determine what physical features in my community influence the local climate by looking at topographic maps.

Climate Change Unit
Activity 1 p. E91
Digging Deeper

- Weather is the state of the atmosphere for a short time (hours-weeks). Climate is a long-term average of weather. A region has a definite climate.
- Latitude is a measure of distance from the equator. Regions near the equator are much warmer than regions near the poles. The amount of solar energy an area gets depends on its latitude. Temps decrease 1 deg F for every 3 deg in latitude away from the equator.
- Glaciers can form at high elevation. Places at high elevation are cooler than those at lower elevations. Temps decrease by 3.6 deg F per 1000 ft in elevation gain.
- Mountain ranges, lakes, and oceans affect the climate of a region. The windward side of mountain chains often receive much more rain than the leeward side. The leeward side has a rain shadow (very little rain) because the moisture fell on the windward side. Air descending the leeward side of the mountains warms up due to greater pressure.
- Temperatures in coastal communities vary less than those of inland communities at the same latitude on a daily basis and seasonally. The differences in climates is because water has a much higher heat capacity than soil or rock. The ocean absorbs heat during the day and releases it at night.
- Cold winds blow across still-warm lake water and gather moisture. Over cold land the water precipitates as snow. Warm oceans supply the moisture for major rainstorms.

IWBAT describe the effects of local geography on local climate. I will demonstrate my understanding in class discussions and written responses using vocabulary such as latitude, temperature, precipitation, and elevation.

Climate Change Unit
Activity 1 p. E91
Digging Deeper

- The entire Earth has a climate called the global climate. During the mesozoic era, the entire planet was warmer than it is today. During glacial intervals, huge sheets of ice covered large portions of northern North America. Global temperatures have gradually increased since the Little Ice Age (mid-1800s).

IWBAT describe the effects of local geography on local climate. I will demonstrate my understanding in class discussions and written responses using vocabulary such as latitude, temperature, precipitation, and elevation.

Climate Change Unit 04/09/18
Activity 2 p. E96

IWBAT investigate and understand the significance of tree rings, glacial ice cores, fossil pollen, and geologic and glacial sediments as indicators of environmental change. I will do this via small group and partner discussions, shared reading, written notes, and responding to questions using vocabulary such as sediment, climate, and pollen.

Podré investigar y comprende la importancia de los anillos de los árboles, los núcleos de hielo glacial, el polen fósil y los sedimentos geológicos y glaciales como indicadores del cambio ambiental. Haré esto a través de discusiones en grupos pequeños y parejas, lectura compartida, notas escritas y respuestas a preguntas usando vocabulario como sedimentos, clima y polen.

Climate Change Unit
Activity 2 p. E96

In Schoology, course Earth Science 2, folder Unit 6 Climate Change, folder Week 2, folder Activity 2,

1. **proceed to the assignment Climate Change Activity 2 Notes & Questions,**
2. **open the attached document,**
3. **complete the What do you see? and Think about it sections,**
4. **discuss your results as a table, and**
5. **be prepared to discuss as a whole class.**

En Schoology, curso Earth Science 2, carpeta Unidad 6 Cambio climático, carpeta Semana 2, carpeta Actividad 2,

1. **proceder a la tarea Actividad 2 sobre Cambio Climático, Notas y Preguntas,**
2. **abra el documento adjunto,**
3. **completa el ¿Qué ves? y Piénsalo secciones,**
4. **discuta sus resultados como una tabla, y**
5. **prepárate para discutir como una clase completa**

IWBAT investigate and understand the significance of tree rings as indicators of environmental change.

Climate Change Unit
Activity 2 p. E96

After the discussion:

- **Complete Parts A & B of the Investigate with a partner.**
- **The diagrams for Part A are available in the Activity 2 folder.**
- **The clay for Part B is on top of tan cabinet 9-12.**
- **The drawing in 2a may be done via Insert -> Drawing or you may do it on paper and then insert an image of that drawing into your document.**

Después de la discusión:

- **Complete las Partes A y B de Investigar con un compañero.**
- **Los diagramas para la Parte A están disponibles en la carpeta de la Actividad 2.**
- **La arcilla para la Parte B está encima del armario tostado 9-12.**
- **El dibujo en 2a se puede hacer a través de Insertar -> Dibujar o puede hacerlo en papel y luego insertar una imagen de ese dibujo en su documento.**

IWBAT investigate and understand the significance of tree rings and fossil pollen as indicators of environmental change.

Climate Change Unit
Activity 2 p. E99

Digging Deeper

- A paleoclimate is a climate that existed sometime in the past. The world was warmer in the Mesozoic Era and experienced periods of glaciation in the northen hemisphere during the Pleistocene Epoch. We are currently in an interglacial period - warmer climate following a glacial period. Today we only have two continental ice sheets.
- The last retreat of continental glaciers occurred 20,000-8,000 years ago. Written records only go back about 2,000 years. Historical accounts exist for certain places, especially in China. More extensive information is required to fully understand climate variability.
- Nothing gives a direct reading of past temperatures, but things can give an indicator of those temperatures and they're called climate proxies (indirect representation). No proxies are perfect.
- Pollen is often preserved in the sediments of lakes and bogs where it has been blown by the wind. Because of the types of pollen found, the climate around the lake at the time of deposit can be inferred. The amounts and types of pollen found indicate changes in climate over time. Fossil plants and insects add information to the climate record.

IWBAT investigate and understand the significance of tree rings, glacial ice cores, fossil pollen, and geologic and glacial sediments as indicators of environmental change.

Climate Change Unit
Activity 2 p. E96
Digging Deeper

- Drilling ice cores from inside glaciers has become a powerful technique for studying paleoclimate. Ice cores have been retrieved from S. Am., Asia, Antarctica, and Greenland. Glaciers are made of snow that does not melt entirely in summer and is compressed into ice by later snows. There are changes in dust content over time. The Antarctic ice core record goes back for over 400,000 years.
- Air bubbles trapped in the ice contain samples of the atmosphere. Atoms come in multiple forms called isotopes. ^{16}O and ^{18}O are similar, but have different weights. Their proportions depend on global temperatures; warmer climate gives a greater proportion of ^{18}O and colder a larger proportion of ^{16}O which can be measured very accurately with special instruments. Another pair of isotopes used are ^{1}H and ^{2}H.
- Air bubbles in the ice contain CO_2 and the amount in the bubbles depends on the amount in the air at the time. CO_2 can be correlated to global temperatures; a warmer climate has more CO_2 than cooler climates. CO_2 can be used for global climate inference because CO_2 is distributed uniformly around the globe.
- A third tool is dust. In colder climates the wind is stronger which erodes more dust which is then deposited in small quantities around the Earth.
- A foraminifera is a sand-sized single-celled animal which accumulates in ocean bottom sediments. In cold climates they spiral in one direction and warmer climates the opposite direction. They contain O; more ^{18}O with colder climates.

IWBAT investigate and understand the significance of tree rings, glacial ice cores, fossil pollen, and geologic and glacial sediments as indicators of environmental change.

Climate Change Unit
Activity 2 p. E96
Digging Deeper

- Glaciers leave recognizeable evidence in the geologic record. They erode the rock beneath them and carry the sediment. This sediment is carried by the wind and deposited as loess. Loess layers reveal several periods of glaciation during the late Pleistocene Epoch. They leave evidence in the ocean when ice bergs break off of glaciers (calve) and melt, dropping their sediments. Glacial sediments are much coarser than most ocean bottom sediments.
- Tree rings show climate by growing larger in warmer climates. Few trees live long enough to show much time passage. Bristlecone pine and sequoias are among those which can live for thousands of years.

IWBAT investigate and understand the significance of tree rings, glacial ice cores, fossil pollen, and geologic and glacial sediments as indicators of environmental change.

Climate Change Unit 11/13/17

Writing prompt:
Week 2 folder

Solicitud de escritura:
Carpeta de la semana 2

Climate Change Unit 04/18/18
Activity 3 p. E105

IWBAT investigate and understand the influence of the tilt of the Earth's axis on the seasons and the shape of the Earth's orbit around the sun on climate. I will do this via small group and partner discussions, shared reading, written notes, and responding to questions using vocabulary such as axis, rotation, and orbit.

Podré investigar y comprende la influencia de la inclinación del eje de la Tierra sobre las estaciones y la forma de la órbita de la Tierra alrededor del sol sobre el clima. Haré esto a través de discusiones en grupos pequeños y parejas, lectura compartida, notas escritas y respuestas a preguntas utilizando vocabulario como eje, rotación y órbita.

Climate Change Unit
Activity 3 p. E105

In Schoology, course Earth Science 2, folder Unit 6 Climate Change, folder Week 3, folder Activity 3,

1. **proceed to the assignment Climate Change Activity 3 Notes & Questions,**
2. **open the attached document,**
3. **complete the What do you see? and Think about it sections,**
4. **discuss your results as a table, and**
5. **be prepared to discuss as a whole class.**

En Schoology, curso Earth Science 2, carpeta Unidad 6 Cambio climático, carpeta Semana 3, carpeta Actividad 3,

1. **proceder a la tarea Actividad 3 sobre Cambio Climático, Notas y Preguntas,**
2. **abra el documento adjunto,**
3. **completa el ¿Qué ves? y Piénsalo secciones,**
4. **discuta sus resultados como una tabla, y**
5. **prepárate para discutir como una clase completa**

IWBAT investigate and understand the influence of the tilt of the Earth's axis on the seasons and the shape of the Earth's orbit around the sun on climate.

Climate Change Unit
Activity 3 p. E105

After the discussion:

- **Complete Parts A2 through E of the Investigate with a partner.**
- **The diagrams for Part A are available on the tan cabinet.**
- **The materials for the succeeding parts are on the tan cabinet, as well.**
- **Part D: We will attempt to do this in the plaza on Thursday.**

Después de la discusión:

- Complete las Partes A2 a E de Investigar con un compañero.
- Los diagramas para la Parte A están disponibles en el armario café.
- Los materiales para las partes siguientes también están en el armario café.
- Parte D: Intentaremos hacer esto en la plaza el jueves.

IWBAT investigate and understand the influence of the tilt of the Earth's axis on the seasons and the shape of the Earth's orbit around the sun on climate.

Climate Change Unit
Activity 3 p. E105
Digging Deeper

- The Earth's axis is tilted at about 23.5 degrees from perpendicular to the plane of its orbit
- The summer solstice is on/about June 22; the winter solstice is on/about Dec. 22
- When the axis is tilted toward the sun it's summer; when it's tilted away it's winter
- Variations in the Earth's orbit around the sun are the major cause of the large variations in Earth's climate which cause the advance/retreat of ice sheets
- The tilt of Earth's axis and its orbit would remain exactly the same if the Earth and the sun were the only two bodies in the solar system
- The Earth's orbital parameters are eccentricity, obliquity, and precession.
- A circle is an ellipse with zero eccentricity. The eccentricity increases as the ellipse become more elongated.
- The distance from the Earth to the sun varies about 3.3% through the year, a very small eccentricity. Insolation is the rate at which the sun's energy reaches the surface of the Earth on the side directly facing the sun. The seasonal variation in insolation varies according to the inverse square law and varies by almost 7 degrees due to orbital position relative to the sun.
- Because of the pull of other planets on the Earth-sun system, the eccentricity changes with time. One full cycle of increase & decrease in eccentricity takes 100,000 years. The difference in insolation ranges from -2 deg to +20 deg from now

IWBAT investigate and understand the influence of the tilt of the Earth's axis on the seasons and the shape of the Earth's orbit around the sun on climate.

Climate Change Unit
Activity 3 p. E105
Digging Deeper

- The Earth is closest to the sun (perihelion) when it's on the side of the Sun's focus and farthest from the sun (aphelion) on the opposite side of the orbit. This makes the winters warmer and the summers cooler in the Northern Hemisphere.
- The tilt of the Earth's axis relative to the plane of orbit is the obliquity. A change in the obliquity would change the nature of seasons. A smaller obliquity would mean warmer winters and cooler summers in the Northern Hemisphere. This may lead to a buildup of glaciers.
- The obliquity varies from 22 deg to 24.5 deg over a period of 40,000 years. At maximum tilt the seasonal differences are somewhat greater, at minimum tilt they are slightly less.
- When the axis of a top is not straight up and down, there is a wobble. The same thing happens with the Earth due to the gravitationl pull of the sun, moon, and planets. The Earth's axial precession has a period of 26,000 years - one complete revolution of its wobble.
- Orbital precession is another important type of orbital variation. The interaction of the two preccessions with the eccentricity of Earth's orbit controls Earth's distance from the sun during the different seasons. Now the NH winter solstice is about the same time as perihelion; in 11,000 years it will be around the time of aphelion.
- Milankovitch cycles hypothesize how Earth's insolation varies over time with orbital changes.

IWBAT investigate and understand the influence of the tilt of the Earth's axis on the seasons and the shape of the Earth's orbit around the sun on climate.

Climate Change Unit
Activity 3 p. E105
Digging Deeper

- Milankovitch used what is known about Earth's orbital parameters (obliquity, eccentricity, and precession) to make his predictions.
- The M-cycles are closely related to glacial-interglacial cycles in recent geologic history. The Antarctic ice core shows how climate has varied over the last 420,000 years. The temperatures seem to be controlled at times by the 100,000 year eccentricity cycle and at other times the 41,000 year obliquity cycle.
- The M-cycles are only the beginning of the story. Other things to be taken into account include evaporation, precipitation, snowfall, snowmelt, cloud cover, vegetation, sea level, and greenhouse gases which interact in complicated ways to produce climate.

IWBAT investigate and understand the influence of the tilt of the Earth's axis on the seasons and the shape of the Earth's orbit around the sun on climate.

Climate Change Unit 04/25/18
Activity 4 p. E117

IWBAT understand how ocean currents are affected by Earth's moving plates. I will do this through interpreting maps and participating in class discussion. I will demonstrate my understanding through orally answering questions and correctly using vocabulary such as climate and currents.

Podré entender cómo las corrientes oceánicas se ven afectadas por las placas móviles de la Tierra. Haré esto a través de la interpretación de mapas y la participación en la discusión en clase. Demostraré mi comprensión a través de preguntas que responden oralmente y el uso correcto de vocabulario como el clima y las corrientes.

Climate Change Unit
Activity 4 p. E117

In Schoology, course Earth Science 2, folder Unit 6 Climate Change, folder Week 4, folder Activity 4,

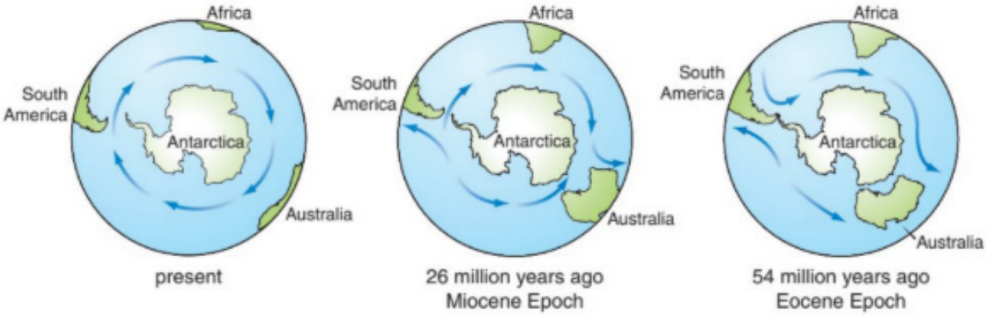
1. **proceed to the assignment Climate Change Activity 4 Notes & Questions,**
2. **open the attached document,**
3. **complete the What do you see? and Think about it sections,**
4. **discuss your results as a table, and**
5. **be prepared to discuss as a whole class.**

En Schoology, curso Earth Science 2, carpeta Unidad 6 Cambio climático, carpeta Semana 4, carpeta Actividad 4,

1. **proceder a la tarea Actividad 4 sobre Cambio Climático, Notas y Preguntas,**
2. **abra el documento adjunto,**
3. **completa el ¿Qué ves? y Piénsalo secciones,**
4. **discuta sus resultados como una tabla, y**
5. **prepárate para discutir como una clase completa**

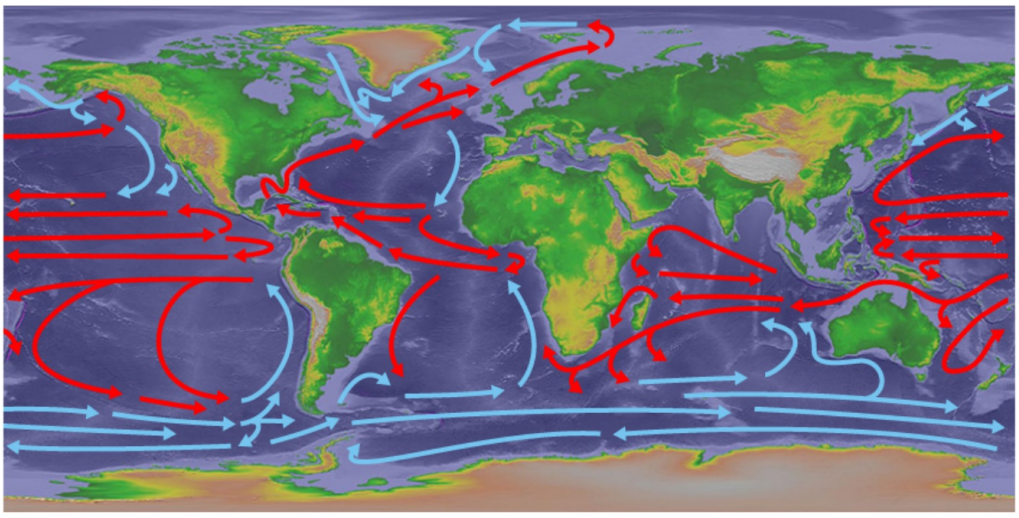
IWBAT understand how ocean currents are affected by Earth's moving plates

Climate Change Unit
Activity 4 p. E117



IWBAT understand how ocean currents are affected by Earth's moving plates

Climate Change Unit
Activity 4 p. E117



IWBAT understand how ocean currents are affected by Earth's moving plates

Climate Change Unit
Activity 4 p. E120

Digging Deeper

- A community near the coast has a more moderate climate than an inland city because water has a higher heat capacity than rocks/soil and warms and cools more slowly than land. Currents are an important factor in coastal climate: a cold current leads to cooler climates while warm currents lead to hotter climates.
- The patterns of ocean circulation have a strong effect on global climate. More solar radiation at the equator versus the poles does not make the equator warmer or the poles colder. Ocean currents carry heat from low latitudes to high latitudes. One of the main methods of this happening is the North Atlantic Deep Water. If this is disturbed, the global climate is affected.
- Pack ice on the ocean is only several meters thick because the snow melts in the salty ocean. Glaciers form on large land areas at high latitudes where snow can accumulate and form masses of ice. The positions of the continents on the Earth change as the lithospheric plates move. Their arrangement has a strong effect on Earth's climate.
- Today the two landmasses with "permanent" continental ice sheets are Antarctica (south) and Greenland (north). There used to be a single supercontinent called Pangea. Part of it moved south far enough for ice sheets to form. Antarctica has maintained its continental glacier during interglacial periods. Had it not, sea levels would have been much higher during interglacial periods.

IWBAT understand how ocean currents affect regional and global climates.

Climate Change Unit
Activity 4 p. E117

Digging Deeper

- Most of the Earth's continental area is in the Northern Hemisphere. Ice sheets can form during parts of the Milankovitch cycles which are favorable for decreased global temperatures. During the times of increased global temperatures, these ice sheets have melted away completely. Besides Antarctica, the Southern Hemisphere doesn't have enough continental land area for large ice sheets to form.
- Volcanoes release CO2 into the atmosphere which leads to warmer global temperatures, but they also release ash which blocks solar energy and leads to cooler global temperatures.
- The weathering of rocks takes CO_2 from the atmosphere and leads to cooler global temperatures. Massive weathering may have lead to the glaciation period from 300-280 million years ago.

IWBAT understand how ocean currents affect regional and global climates.

Climate Change Unit 04/30/18
Activity 5 p. E125

IWBAT compare data to understand the realationship of carbon dioxide to global temperature, evaluate the data to draw a conclusion, and recognize a pattern of information in a graph in order to predict future temperature. I will do this through constructing and interpreting graphs with a partner.

Podré comparar datos para comprender la relación entre el dióxido de carbono y la temperatura global, evaluar los datos para llegar a una conclusión y reconocer un patrón de información en un gráfico para predecir la temperatura futura. Lo haré construyendo e interpretando gráficos con un compañero.

Climate Change Unit
Activity 5 p. E125

In Schoology, course Earth Science 2, folder Unit 6 Climate Change, folder Week 5, folder Activity 5,

1. **proceed to the assignment Climate Change Activity 5 Notes & Questions,**
2. **open the attached document,**
3. **complete the What do you see? and Think about it sections,**
4. **discuss your results as a table, and**
5. **be prepared to discuss as a whole class.**

En Schoology, curso Earth Science 2, carpeta Unidad 6 Cambio climático, carpeta Semana 5, carpeta Actividad 5,

1. **proceder a la tarea Actividad 5 sobre Cambio Climático, Notas y Preguntas,**
2. **abra el documento adjunto,**
3. **completa el ¿Qué ves? y Piénsalo secciones,**
4. **discuta sus resultados como una tabla, y**
5. **prepárate para discutir como una clase completa**

IWBAT compare data to understand the realationship of carbon dioxide to global temperature, evaluate the data to draw a conclusion, and recognize a pattern of information in a graph in order to predict future temperature.

Climate Change Unit
Activity 5 p. E125

After the discussion:

- **Complete Parts A and B of the Investigate with a partner.**
- **The graph paper for for Part A is available on the tan cabinet.**
- **There is a handout of the graph for Part B.**
- **We are not doing Part C.**

Después de la discusión:

- Complete las Partes A y B de Investigar con un compañero.
- El papel cuadriculado para la Parte A está disponible en el armario café.
- Hay un folleto del gráfico para la Parte B.
- No estamos haciendo la Parte C.

IWBAT compare data to understand the realationship of carbon dioxide to global temperature, evaluate the data to draw a conclusion, and recognize a pattern of information in a graph in order to predict future temperature.

Climate Change Unit
Activity 5 p. E128
Digging Deeper

- When there is more CO_2 in the atmosphere, temperatures are higher; when there is less CO_2, temperatures are lower. CO_2 is a greenhouse gas. Correlation does not always mean causation.
- The reason that the Earth is warm enough to maintain life is the greenhouse gases allow sunlight to pass through and hold in some of the energy radiating back to space. Without these gases the Earth would be completely frozen. Water vapor is the most important greenhouse gas. Other GHGs include methane (CH_4), CO_2, and nitrogen oxides (NOx).
- Most solar radiation passes through the atmosphere without being absorbed and is absorbed by the Earth's surface. The wavelength of radiation depends on surface temperature: hotter temperatures, shorter wavelengths. The extremely hot sun surface radiates short wavelength energy (visible, ultraviolet, etc). The cooler surface of Earth radiates longer wavelengths (visible, infrared, etc.).
- GHGs are those that absorb some of Earth's outgiong radiation; not all of it is absorbed, but much of it is. The GHGs then re-radiate energy toward the surface of the Earth keeping the surface warmer than if there were no GHGs.
- There are two main ways to put CO_2 into the atmosphere: volcanic eruptions & oxidation of organic matter. Oxidation of organic matter occurs naturally when plants and animals decay and animals respirate. Burning of wood and fossil fuels (coal, natural gas, oil, etc.) also puts CO_2 into the atmosphere.

IWBAT compare data to understand the realationship of carbon dioxide to global temperature, evaluate the data to draw a conclusion, and recognize a pattern of information in a graph in order to predict future temperature.

Climate Change Unit
Activity 5 p. E128 Digging Deeper

- Plants consume CO_2 during photosynthesis. The weathering of some rocks consumes CO_2. Plants and algae use CO_2 to make organic matter which stores away the CO_2. Carbon is transformed and moves from place to place. The only way to remove it from the active cycle is to bury it deeply in sediments, but it will likely return in future geologic time.
- The more CO_2 in the environment, the warmer global temperatures are. On the scale of hundreds of thousands of years, temperatures & CO_2 track well together, but Milankovitch cycles may explain this periodicity. On the scale of centuries, it is very likely that CO_2 is the cause of at least part of global warming.
- Human emissions of GHGs contribute significantly to the amount of GHGs in the atmosphere, primarily by adding CO_2 via burning fossil fuels. Scientists are concerned about the increasing concentrations of CO_2 in the atmosphere since the Industrial Revolution, from 300 ppm to 360 ppm in 1995.
- Many nations want to reduce the total amount of GHGs produced in an effort to reduce the global temperature increase. Some people believe that CO_2 emissions should be reduced even though the science is unsettled about CO_2 contributions to global warming. Some people do not want to disrupt the current economy in this way since the future danger is uncertain. Once rapid global warming takes place, it may be too late to do anything about it.
- CO_2 is also dissolved in ocean water. This lessens the effect of the burning of fossil fuels. CO_2 is also stored by reforestation. There is a lot more forested land in the eastern US now than at the time of the Civil War.

IWBAT compare data to understand the realationship of carbon dioxide to global temperature, evaluate the data to draw a conclusion, and recognize a pattern of information in a graph in order to predict future temperature.

Climate Change Unit
Activity 6 p. E136

IWBAT brainstorm ways climate change might affect the Earth and my community, explain some of the effects of global warming, understand positive and negative feedback loops, and understand and evaluate the limitations of models in studying climate change through time. I will do this through group discussion, creating a poster, and writing down an experiment design on paper which could test an aspect of climate change. I will use vocabulary such as precipitation, plant life, and atmosphere.

Podré intercambiar ideas sobre cómo el cambio climático podría afectar a la Tierra y a mi comunidad, explicar algunos de los efectos del calentamiento global, comprender circuitos de retroalimentación positivos y negativos y comprender y evaluar las limitaciones de los modelos para estudiar el cambio climático a través del tiempo. Haré esto a través de una discusión grupal, creando un póster y escribiendo un diseño de experimento en papel que podría poner a prueba un aspecto del cambio climático. Usaré vocabulario como precipitación, vida vegetal y atmósfera.

Climate Change Unit
Activity 6 p. E136

In Schoology, course Earth Science 2, folder Unit 6 Climate Change, folder Week 5, folder Activity 6,

1. **proceed to the assignment Climate Change Activity 6 Notes & Questions,**
2. **open the attached document,**
3. **complete the What do you see? and Think about it sections (Schoology discussion), and**
4. **be prepared to discuss as a whole class.**

En Schoology, curso Earth Science 2, carpeta Unidad 6 Cambio climático, carpeta Semana 5, carpeta Actividad 6,

1. **proceder a la tarea Actividad 6 sobre Cambio Climático, Notas y Preguntas,**
2. **abra el documento adjunto,**
3. **completa el ¿Qué ves? y Piénsalo secciones (discusión en Schoology), y**
4. **prepárate para discutir como una clase completa**

IWBAT brainstorm ways climate change might affect the Earth and my community and explain some of the effects of global warming.

Climate Change Unit
Activity 6 p. E136

After the discussion:

- **Complete steps 1-2 of the Investigate as a table group.**
  - **All partners must be listed in all partners' documents**
  - **All partners must list the remaining ideas on step 2**
- **The poster paper for for step 2 is available on the tan cabinet.**

Después de la discusión:

- Complete los pasos 1-2 de Investigar como un grupo de tablas.
  - Todos los socios deben figurar en todos los documentos de los socios
  - Todos los socios deben listar las ideas restantes en el paso 2
- El papel de póster para el paso 2 está disponible en el gabinete de bronceado.

IWBAT brainstorm ways climate change might affect the Earth and my community and explain some of the effects of global warming.

Climate Change Unit
Activity 6 p. E138 Digging Deeper

- Scientists believe that the world's climate is becoming warmer due to GHGs such as CO_2, methane, and NOx. It is hard to say if the world's climate is warming because it experiences warmer years and cooler years. The remote sensors on the Atlantic Ocean help us make estimates of global climate. The consensus is that the global average temperature is increasing.
- Computer models do calculations based on temperatures, soil moisture, & plant transpiration. The physics of clouds is an important but complicated factor. Scientists are working hard to improve their models.
- The many factors that influence Earth's climate include ocean currents, GHGs, Milankovitch cycles, and continent locations. The ways they interact are called feedback loops.
- Positive feedback occurs when two factors operate together and the effects add up. Negative feedback occurs when two variables are in opposition to each other and counteract the effects of the other: weathering & CO_2 buildup.
- Warmer temperatures increase evaporation which increases cloud cover which in turn increases the reflection of solar radiation and retention of heat radiated from the ground. The uncertainty of feedback loops makes it hard to predict climate responses.
- Some of the models from past years can be tested against current data to improve the computer models. The models come up with possible scenarios for climate changes due to increasing GHGs.

IWBAT understand positive and negative feedback loops and understand and evaluate the limitations of models in studying climate change through time.

Climate Change Unit
Activity 6 p. E138 Digging Deeper

- More clouds lead to more rain and warmer temperatures can lead to more rain events. More precip. in the winters, less in the summers, and greater extreme weather events (e.g. hurricaines).
- Glaciers have been shrinking in recent years and a continued warm Earth will cause ice sheets to melt into the ocean causing the sea level to rise as much as one meter by the year 2100.
- In the Northern Hemisphere, warmer temps would cause a northward shift in where crops are grown. Some places may become too dry or too wet to grow the current crops. Some crop production may remain but become less productive. Wetter winters and drier summers would also change agriculture.
- Ocean circulation helps distribute solar heat around the globe. Melting glaciers in the north Atlantic could disturb the circulation again like happened 12,000 years ago and have effects which reach around the world.

IWBAT understand positive and negative feedback loops and understand and evaluate the limitations of models in studying climate change through time.